—The patriot-flame with quick contagion ran,
Hill lighted hill, and man electrified man;
Her heroes slain awhile COLUMBIA mourn'd,
And crown'd with laurels LIBERTY return'd.

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SCIENTIFIC BOOKS

The Modern Milk Problem. By J. SCOTT MACNUTT, Lecturer on Public Health Service, Massachusetts Institute of Technology. Macmillan Co., New York. 253 pages. Price $2.00

It would seem as if little that is new and interesting could be added to the multitudinous papers, circulars and books on milk that have appeared in recent years. The present book is a distinct acquisition, however, to the literature on the subject. It is written in a clear style, and presented in such a way as to command the reader's attention throughout. While the various important phases of milk production are dealt with at some length, with due emphasis on the necessity of producing clean and safe milk, its most distinctive feature is its illuminating treatment of the economic factors which enter into the present-day milk problem.

Like Rosenau, the author believes that the producer is the victim of unfortunate circumstances, that he is little understood, and that as a rule he does not receive sufficient compensation for the capital which he has invested, the risks which he assumes, and the efforts and long hours which he devotes to his work. On the other hand, milk is milk to the consumer, and he will, with some exceptions of course, not protect himself against possible infection, but relies upon health authorities and medical or civic organizations to stand vigil for him.

One of the chief obstacles to a satisfactory solution of the milk problem is the lack of understanding and cooperation between the producer and those who are entrusted with the enactment and the enforcement of rules and regulations to protect the public. The State Agricultural Experiment Station is to-day doing much to instruct the farmer in the ways of economic milk production, a duty which no other agency can better perform.

Good and pure milk is a necessity. Aside from an inconsiderable amount of certified milk, milk is either good or bad, according to the author. So long as the ordinary producer stays within the minimum requirements of the law he has no incentive to increase the quality of his products. A premium paid on quality is one of the solutions of the good milk problem. Few producers are paid for the extra effort, and hence are content if they remain unmolested by the prosecutor.

The laboratory method of determining the quality of milk is, in the author's judgment, the most important, while inspection is of little merit, aside from the instruction to the producer in rational methods of clean milk production. The dairy score card also is of relatively little value, as it does not furnish a true index of the real quality of milk. Pasteurization, except for the highest grade, is necessary to protect the consumer. Grading and the laboratory examination are the most important single means of sanitary control, grading being the most important single factor in economic adjustment. Fair milk prices should be paid to both farmer and dealer on the basis of quality.

Several pages of well-chosen references are given, and the last 68 pages of the book are devoted to a comprehensive appendix in which valuable technical and statistical information is contained, as shown in the titles: Milk Statistics in the United States, Grading Systems of the Commission on Milk Standards, the North System, Costs and Prices, and Local Experiences and Investigations.

The book is designed to furnish information, in the author's words—"not merely for health officials and milk inspectors, but also for dairymen and city milk dealers, agricultural authorities, legislators charged with the framing of milk laws, inquiring consumers and members of organizations engaged in efforts to secure better milk supplies, physicians, and all others who are interested in the

understanding and solution of the milk problem."

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SPECIAL ARTICLES

GRAVITATIONAL REPULSION[1]

IN a paper entitled "Gravitation and Electrical Action" published by The Academy of Science of St. Louis, on July 28, 1916,[2] the following passage may be found:

> These results seem to indicate clearly that gravitational attraction between masses of matter depends upon their electrical potential due to electrical charges upon them.

Every working day of the present college year has been devoted to testing the validity of the above statement. All of the experimental results confirm this conclusion. No discordant results have been obtained. Not only was gravitational attraction diminished by charges of electricity upon the attracting bodies, when direct electrical action was wholly cut off by a metal shield, but gravitational attraction was converted into a repulsion which was greater than the normal attraction. On two days, when the influence machine, driven by a single-phase motor, was most highly efficient, the value of the gravitation constant was reduced by 250 and 300 per cent. of its maximum value. The maximum value of the gravitational attraction was evidently exerted when the potential of the attracting masses was zero absolute. The suspended masses were two spheres of lead, having a diameter of one inch, and distant from each other 91.5 cm. They were suspended on two untwisted threads of silk fibers, about 3.4 millimeters apart, and having a length of 179 cm. These silk threads were tied together at the top and hung around a pulley one inch in diameter. Below were two movable pulleys by means of which the distance between the silk threads could be adjusted to a parallel position. The large masses were spheres of lead having a diameter of 10 inches. They were mounted on blocks of wood having caster-wheels provided with roller bearings, which rested upon heavy sheets of hard rubber. The screen around the suspended masses was in part composed of wood, forming the top, bottom, and ends. The sides which faced the large masses each consisted of two sheets of heavy cardboard, outside of which was a sheet of metal. They were securely clamped to the top, bottom and ends of the enclosing shield by means of bars of wood and the joints were sealed by means of bees-wax, which was melted and run into the joints by means of a hot iron. The entire screen was then surrounded by another shield of metal. A layer of air about 1.5 cm. in thickness was thus formed between the two metal sheets on either side. A sheet of glass was also placed between each of the large masses and the metal sides of the shield. A box of metal filled with loose cotton-batting was placed in contact with the metal shield, alternating in position with the large masses. This was done in order to prevent as far as possible radiation from the northern sky from producing unbalanced convection currents in the air within the screen.

The large masses, the metal boxes containthe cotton, and the metal screen were all in metallic connection with each other. All heat from the heating system of the building was cut off. The change in the position of the suspended masses was determined by means of a mirror, telescope and scale, observation being made through a narrow slit in the screen which was covered by a plate of photographic glass, sealed to the inner sheet of metal.

Three feet distant from the ends of the screen and the side opposite to the observing telescope was a line of insulated metal rods upon which was hung metal strips armed with 800 pins. At one end of this line of rods was a metal disc armed with 150 pins. Facing this disc was a duplicate disc attached to a line of rods hung upon silk cords, and leading to the influence machine in an adjoining room. There was no gap in the line of rods excepting between the two discs having 150 pins soldered to them. The rods carrying the 800 pins were

[1] Abstract of a paper to be published by the Academy of Science of St. Louis.

[2] *Trans. Acad. of Sc. of St. Louis,* XXIII., 4, p. 173.